

## CLAIMS

We claim:

1. A millimeter- and submillimeter-wave noise apparatus comprising  
a means for generating millimeter- and submillimeter-wave noise, wherein said noise  
comprises one or more frequencies in the range between 110 to about 400 GHz; and  
a transmission structure.
2. The apparatus of claim 1 wherein said noise further comprises one or more frequencies in  
the range between about 60 to 110 GHz.
3. The apparatus of claim 2 wherein said noise is continuous across a range of frequencies  
from about 60 to about 400 GHz.
4. The apparatus of claim 1 wherein said means for generating said noise comprises:  
a frequency multiplier for converting microwave noise into said noise.
5. The apparatus of claim 1 wherein said means for generating said noise comprises:  
a harmonic mixer.
6. The apparatus of claim 1 wherein said apparatus is portable.
7. A spectrometer comprising  
the apparatus of claim 3.
8. The spectrometer of claim 7 wherein said spectrometer is a Fourier Transform  
Spectrometer.
9. A method of producing millimeter- and submillimeter-wave noise comprising the steps  
of:  
generating a first noise band; and  
converting said first noise band into a second noise band, wherein said second noise band  
comprises millimeter- and submillimeter-wave noise.
10. The method of claim 9 wherein said second noise band is continuous across a range of  
frequencies from about 60 to about 400 GHz.
11. The method of claim 9 wherein said second noise band is continuous across a range of  
frequencies from about 60 GHz to about 1 THz.
12. The method of claim 9 wherein said first noise band comprises noise of frequencies  
between about 0.1 to about 60 GHz.

13. The method of claim 9 further comprising  
adjusting said first noise band to a designated power level prior to said converting step.
14. The method of claim 13 wherein said converting step comprises  
inputting said adjusted first noise band into a frequency multiplier, wherein said  
designated power level is a maximum safe input power level of said frequency multiplier.
15. The method of claim 13 wherein said adjusting step comprises  
amplifying a power of said first noise band.
16. The method of claim 13 wherein said adjusting step comprises  
attenuating a power of said first noise band.
17. The method of claim 9 further comprising  
directing said second band of noise toward a destination.
18. A millimeter- and submillimeter-wave noise generating apparatus comprising:  
a microwave noise source for generating microwave noise;  
means for adjusting a power of said microwave noise source to a designated level; and  
a frequency multiplier for converting said adjusted microwave noise into millimeter- and  
submillimeter-wave noise, wherein said designated level is a maximum safe input level of said  
frequency multiplier.
19. The apparatus of claim 18 wherein said means for adjusting comprises  
one or more microwave amplifiers.
20. The apparatus of claim 19 wherein said means for adjusting further comprises  
a level-set attenuator.
21. The apparatus of claim 18 wherein said millimeter- and submillimeter-wave noise is  
continuous across a frequency range of about 60 GHz to about 400 GHz.
22. The apparatus of claim 18 wherein said millimeter- and submillimeter-wave noise is  
continuous across a frequency range of about 60 GHz to about 1 THz.
23. The apparatus of claim 18 further comprising  
a transmission structure coupled to an output of said frequency multiplier for directing  
said millimeter- and submillimeter-wave noise.
24. The apparatus of claim 18 wherein said microwave noise source is selected from the  
group consisting of: a diode noise source, a noise tube, and a thermal noise source.

25. The apparatus of claim 18 wherein said frequency multiplier is a semiconductor diode multiplier.
26. The apparatus of claim 18 wherein said apparatus is portable.
27. The apparatus of claim 18 further comprising  
one or more band-pass filters coupled to said frequency multiplier to create one or more discrete millimeter- and submillimeter-wave noise bands.
28. A spectrometer comprising:  
said apparatus of claim 18.
29. A method for generating millimeter and submillimeter-wave noise power comprising the steps of:  
producing microwave noise power;  
amplifying said microwave noise power into amplified noise power;  
adjusting said amplified noise power to a designated power level; and  
converting said adjusted noise power to millimeter- and submillimeter-wave noise through a frequency multiplier, wherein said designated power level is the maximum safe input level of said frequency multiplier.
30. The method of claim 29 further comprising  
testing millimeter- and submillimeter-wave components using said millimeter- and submillimeter-wave noise.
31. The method of claim 29 further comprising:  
directing said millimeter and submillimeter noise from said frequency multiplier into a Fourier Transform Spectrometer; and  
performing Fourier Transform Spectrometry on a test sample.
32. The method of claim 29 further comprising  
characterizing materials using said millimeter- and submillimeter-wave noise.
33. The method of claim 29 wherein said millimeter- and submillimeter-wave noise is continuous across the frequency range between about 60 to about 400 GHz.
34. The method of claim 29 wherein said millimeter- and submillimeter-wave noise is continuous across the frequency range between about 60 GHz to about 1 THz.

35. A noise generator comprising  
a means for generating noise, wherein said noise has a noise temperature greater than 2000 °K and comprises one or more frequency bands in the range between 110 GHz to about 1.2 THz; and  
a transmission structure.
36. The apparatus of claim 35, wherein said noise further comprises one or more bands in the range between about 60 GHz to 110 GHz.
37. The apparatus of claim 36, wherein said noise is continuous across a range of frequencies from about 60 GHz to about 1.2 THz.
38. The apparatus of claim 35 wherein said means for generating said noise comprises:  
one or more frequency multiplier chains for converting microwave noise into said noise.

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